

July 24, 2003  
Case No.: DP-304183 (7500/60)  
Serial No.: 09/943,961  
Filed: August 31, 2001  
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**SPECIFICATION AMENDMENTS**

Please replace the paragraph beginning at page 6, line 1 with the following rewritten paragraph:

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*P* "In one embodiment, controller 51 includes a microprocessor 52 operatively coupled to one or more solid-state memory devices 53. Microprocessor 52 is preferably a microprocessor from one of the Intel, AMD, or Motorola families of microprocessors. Memory 53 is one or more computer readable mediums (e.g., a read-only memory, an erasable read-only memory, a random access memory, a compact disk, a floppy disk, a hard disk drive, and other known forms) that are electrically, magnetically, optically or chemically altered to contain computer readable code corresponding to a master control routine 60 (FIG. 3) for intelligently providing a commutation control signal CC<sub>S</sub> to interface 54, and is arranged for reading and writing of data in accordance with the principles of the present invention. In alternative embodiments of controller 51, the computer program product corresponding to master control routine 60 (FIG. 3) can otherwise be partially or fully implemented by digital circuitry, analog circuitry, or both (e.g., an application specific integrated circuit (ASIC))."

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\ Please replace the paragraph beginning at page <sup>7</sup>~~8~~, line 1 with the following rewritten paragraph:

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A<sup>2</sup> "When rotor position sensor 55 is included within control device 50, rotor position sensor 55 conventionally provides a position detection signal  $PD_5$  to controller 51. Position detection signal  $PD_5$  is indicative of a sensed rotational position of rotor 40 (FIG. 1) whereby controller 51 can conventionally estimate the position of rotor 40. Those having ordinary skill in the art will appreciate the various embodiments of rotor position sensor 55 as known in the art, such as, for example, an arrangement of Hall Effect sensors, encoders, and the like. Alternatively, when rotor position sensor 55 is excluded from control device 50, interface 54 implements algorithms known in the art to estimate the position of rotor 40 as a function of phase currents  $[[I_{PS1-PS4}]]$   ~~$I_{PS1}$~~   ~~$I_{PS4}$~~ ."

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\ Please replace the paragraph beginning at page 10, line 1 with the following rewritten paragraph:

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A<sup>3</sup> "During a stage S86 of routine 80, controller 51 controls an excitement of two or more phases remote from the target position. The excitation is accomplished by controller 51 directing interface 54 via commutation control signal  $CC_5$  to provide corresponding phase currents to the corresponding windings with a differential ampere level between the phase currents of the remote phases. For example, phase A and phase B are the phases that are remote the -23° position of phase A aligned and interface 54 therefore directs a flow of phase current  $I_{PS1}$  through winding 31 and winding 35 at an ampere level  $X_2$  for a time period  $t_3$  and a flow of phase current  $I_{PS2}$  winding 32 and winding 36 at ampere level  $X_1$  for time period  $t_3$  to thereby rotate rotor 40 to the -23° position of phase A aligned as shown in ~~FIG. 5B~~ FIG. 5C."

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Please replace the paragraph beginning at page 11, line 16 with the following rewritten paragraph:

A4  
"In one embodiment of stage S92, each time period  $t_{4-7}$  is fixed at a particular level (e.g., 2 milliseconds). In a second embodiment of stage S92, each time period  $[[t_{4-7}]]$   ~~$t_{4-7}$~~  is fixed at one or more various levels (e.g.,  $t_4$  being 2 milliseconds,  $t_5$  being 1.8 milliseconds,  $t_6$  being 1.6 milliseconds, and  $t_7$  being 1.4 milliseconds). In a third embodiment of stage S92, controller 51 dynamically determines the levels of time periods  $[[t_{4-7}]]$   ~~$t_{4-7}$~~  as a function of operating parameters of the motor as would occur to those having ordinary skill in the art, such as, for example, any load torque applied by the motor, a power supply for the motor, a temperature of the motor, and a responsiveness level of the motor to the phase currents  $[[I_{ps1-ps4}]]$   ~~$I_{ps1-ps4}$~~ ."

Please replace the paragraph beginning at page 12, line 23 with the following rewritten paragraph:

A5  
"In one embodiment of stage S106, controller 51 directs interface 54 to sequentially excite phases adjacent the holding position for one or more time cycles. The sequential excitation is accomplished by controller 51 directing interface 54 via commutation control signal  $CC_s$  to sequentially provide corresponding phase currents to the corresponding windings for one or more cycles. For example, when the holding position corresponds to phase A aligned as shown in FIG. 1A and rotor 40 was rotated in a counterclockwise direction to the holding position, interface 54 directs a flow of phase current  $I_{ps4}$  through winding 34 and winding 38 for a predetermined time period to thereby excite phase D whereby rotor 40 is rotated in a clockwise direction. Interface 54 then directs a flow of phase current  $I_{ps1}$  through winding 31 and winding 32 for a predetermined time period to thereby again excite phase A whereby rotor 40 is rotated

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back to the holding position in a counterclockwise direction. The cycle of sequentially exciting phases D-A can be repeated as needed. In a second embodiment of stage ~~S105~~ S106, one or more cycles of sequentially exciting D-C-D-A is repeated as needed. In a third embodiment of stage S106, one or more cycles of sequentially exciting D-C-B-C-D-A is repeated as needed."

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Please replace the Abstract of the invention with the ABSTRACT OF THE DISCLOSURE attached hereto.